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The Dry Weather of January to June, 1929

The year 1929 opened with two months of abnormal cold, which were described in the *Meteorological Magazine* for February and March. The abnormality has continued, taking the form of one of the most intense droughts of the past century. The average rainfall in percentage of normal in each month has been as follows:—

	Jan.	*Feb.*	*Mar.*	*Apr.*	*May*	*June*	*Average*
England & Wales	71	49	13	57	103	78	62
Scotland ...	49	54	24	76	107	124	72
Ireland	57	129	24	51	109	83	75
Brtish Isles ...	63	67	18	61	105	91	67

Some notes on the dryness of the months of January to March were also given in the magazine for April, p. 71. Considering the four months January to April, with an average of 52 per cent. over the British Isles, we can say that in the past 70 years only one period of four consecutive months—October, 1879, to January, 1880—had a smaller proportion of their normal fall, though in March to June, 1893, the proportion was the same as in January to April, 1929. The whole period of six months however shows up less dry than either February to July, 1921, or February to July, 1887, in England and Wales; but over the British Isles as a whole January to June, 1929, was as dry as February to July, 1921.

The distribution of pressure has been correspondingly abnormal. A chart of the deviations of pressure from normal during

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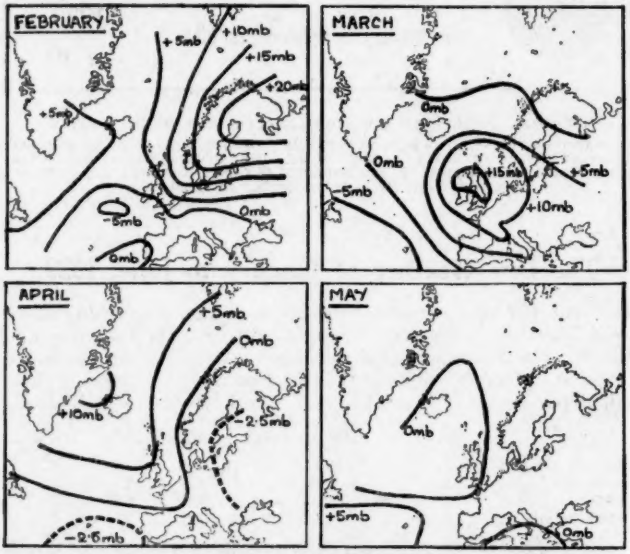
January was given in the *Meteorological Magazine* for February, p. 2; it showed an excess of more than 20mb. over Iceland, and a deficit of more than 5mb. over the Azores. The deviations of pressure from normal during the months of February, March, April and May are shown in the illustration to this article. In February, pressure was more than 20mb. above normal over Scandinavia, giving the easterly winds which made that month so cold. In March the excess had shifted to the British Isles; the pressure deviation of + 16·5mb. at Malin Head has not been



PRESSURE ANOMALIES, 1929.

exceeded in any month in this country for at least 89 years. In April the excess was centred north-east of Iceland and exceeded 10mb. In May pressure was slightly below normal over the British Isles, as would be expected from the slight excess of rainfall, and in June pressure was nearly normal over the British Isles but was above normal north west of Iceland. The pressure chart for June was not available in time for reproduction, but a brief description will be found on p. 148. Thus it will be seen that the average distribution of pressure during the first four months of 1929 has been characterised by a marked excess near or to the north of the British Isles.

It has been found that such a distribution frequently, though

not invariably, follows certain abnormalities in the oceanic conditions to the west and north of the British Isles. To the west we have the waters of the Atlantic. When the surface of the North Atlantic west of the British Isles is abnormally cool, there is a tendency for pressure to be above normal near Iceland and below normal near the Azores. The surface temperature of the North Atlantic depends to some extent on the temperature and volume of the Gulf Stream, which is governed largely by the strength and steadiness of the trade winds, strong trade winds causing a high surface temperature 12 to 21 months later. The south-east trade is more important than the north-east trade, the effect of the latter being weak and uncertain. We find that while from February, 1928 onwards the north-east trade has been abnormally weak, the south-east trade has been of practically normal strength during the past two years, the average velocity at St. Helena having been only 0·3m/s. below normal in 1927, and 0·1m/s. below in 1928. It seems, therefore, that variations of the trade winds can have been only a minor factor in the abnormal pressure distribution of the past six months.

The second important factor in our weather lies to the north, namely, the state of ice in the Arctic. Generally speaking, a deficiency of Arctic ice tends to be followed by a weak atmospheric circulation, so that pressure is above normal in Iceland and below normal over the Azores. The effect varies in different seasons; in the two or three years following an abnormal deficiency of Arctic ice, pressure tends to be above normal over Iceland from January to June and above normal over the British Isles in winter and early spring, but below normal over the British Isles in summer (see *Meteorological Magazine*, 63, 1928, p. 214).

The data collected and published annually by the Danish Meteorological Institute under the title, *State of Ice in the Arctic Seas*, show that both in 1927 and 1928 the amount of ice in the Arctic Ocean and Greenland Seas was unusually small. Except for the latter half of May, 1928, the coasts of Iceland have been entirely free of ice, and the fringes of the ice area have receded to an unusual extent in the Greenland Sea, Barents Sea and Kara Sea. From the summer conditions (April to August) in these three seas an Arctic " ice index " can be formed (see *Geophysical Memoirs*, No. 41, p. 27), and for the year 1928 this index figure was 91, the average for the past 34 years being 108.

Another factor in the pressure distribution over the North Atlantic is the previous meteorological situation in north-east Africa, represented by the height of the Nile flood. Mr. E. W. Bliss has found that a high flood tends to be followed by a cold dry winter in the British Isles, which we can also connect with the relation that a high flood tends to be followed by high pressure over Iceland and Greenland and low pressure over the

Azores. Actually during July to September, 1928, the Nile flood at Aswan was somewhat higher than usual though the excess was apparently not remarkable and the river was below its usual height in the latter part of September and in October. Still, these north African conditions may have been a contributing factor in the abnormal pressure distribution over the North Atlantic during 1929.

We have found then that preceding conditions in other parts of the world were such that there existed a definite tendency for pressure to be well above normal to the north of the British Isles during the first half of 1929. That would give us frequent easterly winds and a cold winter, but alone it is not a sufficient explanation of the long-continued drought. High pressure over Iceland only gives us dry weather if it also extends over the British Isles as it did this year, especially in March and June. High pressure over Iceland may be associated with low pressure over the British Isles, in which case we have a wet season, and at present the reason why the limit of the Icelandic high pressure fluctuates in this way remains rather obscure. Probably it is due to some factor, perhaps in the upper air, which has not yet been investigated.

C. E. P. Brooks.

Contamination of the Wick and Muslin of Wet Bulbs at Coastal Stations

By H. Garnett, M.Sc.

It is the practice in country districts to change the wick and muslin of the wet bulb thermometer about once a month, the assumption being made that over that period contamination of the muslin occurs only to so small an extent that values of relative humidity calculated from observations of the dry and wet bulb readings are affected but slightly. This course is probably quite justified in districts remote from towns or other sources of atmospheric pollution, but in these latter areas, as shown in a note by Dr. R. C. Sutcliffe appearing in the *Meteorological Magazine* for July, 1928, the wick and muslin requires to be changed more frequently. Furthermore, observations by D. O. Maclean at Tiree show that an appreciable effect is produced on the wet bulb readings by salt spray. It was to investigate the effect of salt spray on the values of relative humidity that the present work was carried out.

For this purpose the observer at Wick, Scotland, was asked to change the wick and muslin of the wet bulb every seven days and add a note in the monthly return of observations to indicate the change. This was done for the period November 1st, 1926, to

April 1st, 1928, with the exception of short periods for which no record of changes was made.

The exposure of the station at Wick is very open, being situated on a headland on the south side of Wick Harbour with bare and open country in all directions except to the north-west, where the town of Wick lies. To the east there is an open exposure to the North Sea, and the coast here being rocky, conditions are very favourable for the presence of salt spray in the atmosphere. The station is 81 feet above sea level, close to the edge of the cliff.

Following the day on which the wick and muslin were changed, the daily mean relative humidity was taken for each of the six succeeding days and a mean of these daily values taken to give six values representative of the change in humidity with the passage of time following the renewal. These humidity values were plotted against the number of the day after the renewal As was to be expected there was no systematic variation in the daily values obtained, so in order to arrive at a smooth curve it was necessary to take a mean over a long period. Hence mean values were first obtained for the whole period November 1st, 1926, to April 1st, 1928. This period was then subdivided into three, two winter periods November, 1926, to March, 1927, and October, 1927, to March, 1928, and the summer period April, 1927, to August, 1927. For each of these the same procedure was followed, giving in all four curves, which are as shown.

It is presumed that contamination of the wick and muslin is due to salt spray in the atmosphere, and hence one might expect that the presence of salt on the muslin would give an increase in the temperature of the wet bulb, in keeping with the theory of the action of this psychrometer. Vapour pressure over the salt solution being less than over pure water, the difference in the dry and wet bulb readings should gradually decrease with increasing concentration and hence with passage of time. Consequently one would expect curves of the form shown in Fig. 1, but actually they are of the form shown in Fig. 2—relative humidity increasing to a maximum value either two or three days after the renewal and then decreasing. The curves for the two winter periods are very similar, the maximum occurring on the same day in each—on the second day after renewal. In the curve for the summer period the maximum occurs on the third day. This is quite in keeping with expectations, high winds and rough seas in winter resulting in a greater concentration of salt in the atmosphere than is obtained during the quieter weather of summer. The first part of the curves then

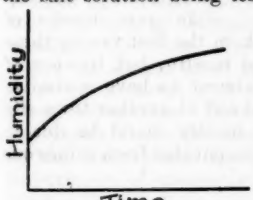


FIG. 1.

bears out what one would expect from a cursory glance at the problem. But the falling off in humidity after the maximum value has been obtained is not easily explained. It would appear that the maximum effect of the salt is obtained after two or three days, and it may be suggested that afterwards the muslin perhaps takes on a roughened surface which materially enhances evaporation with a consequent lowering of the figure deduced for humidity. The magnitude of the effect appears to be quite appreciable and sufficient to be of considerable importance. The initial rise in relative humidity is some 4 per cent. or 5 per cent. and the subsequent fall 2 per cent., or 3 per cent.

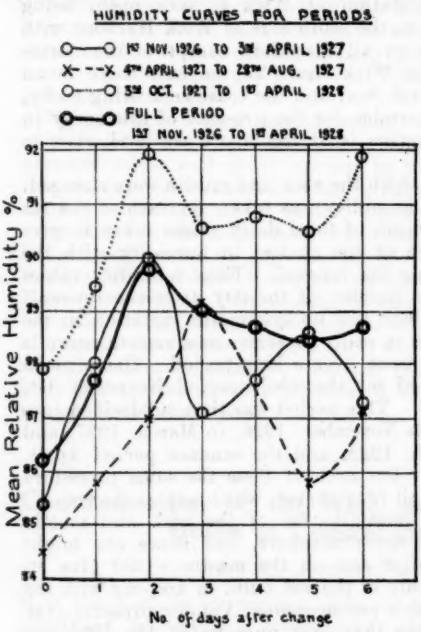


FIG. 2.

The investigation carried out by Dr. Sutcliffe gave results of a similar nature to those found at Wick in the first two or three days after the renewal of the wick and muslin, but in view of the subsequent effect it might be of interest to have a similar investigation to this present one carried out at another town site where contamination of the wick and muslin would be due to the solid impurities in the atmosphere inseparable from numerous smoking chimneys.

Royal Meteorological Society

The monthly meeting of this Society was held on Wednesday, June 19th, at 49, Cromwell Road, South Kensington, Sir Richard Gregory, D.Sc., President, in the Chair.

F. J. W. Whipple, Sc.D.—Potential gradient and atmospheric pollution; the influence of "Summer Time."

The electrical potential gradient being affected by atmospheric pollution it was to be expected that the diurnal variation would

assume a new character when " Summer Time " was introduced. The Kew Observatory records for periods before and after 1916 have been compared. There are normally two oscillations of potential gradient in the 24 hours. It is found that the early morning minimum and the forenoon maximum were both advanced when " Summer Time " came in, whereas the second oscillation of the day was reduced in amplitude.

A. J. Bamford, M.C., M.A.—Vertical air-currents as measured by pilot balloons.

This paper is an attempt to explain some of the mechanism of tropical convection. The results of the last seven years' pilot balloon observations at Colombo show that in the first half-kilometre the average rate of ascent is considerably faster than the theoretical rate given by the Dines formula, while in the next half-kilometre it is appreciably less than this value. At first sight a curious congestion of air near the half-kilometre level is suggested, but by considering the distribution as well as the amount of the observed accelerations and retardations the writer suggests that the slow upward velocities between one-half and one kilometre can be reconciled with a general atmospheric movement that is on the whole upwards in these layers, by accepting the idea that tropical convection occurs in the form of large rolling whirls of at least a kilometre in diameter, the effect of such whirls being to displace balloons from the ascending side towards the descending side after they pass the level of the centre. The fact that when the mean of several thousand balloon flights shows retardation in a certain level does not appear to indicate that the general air movement at that level is downward, is apparently depressing, from the point of view of observational meteorology; the writer, however, prefers to regard the matter more cheerfully as affording a picture of the structure of tropical convection that would not have been available otherwise. The next part of the paper deals with cases where the simple whirl system is complicated by monsoonal and other circulations, and the last part deals with observations up to ten kilometres. These latter show a consistent, and increasing excess above the theoretical values, but attention is called to the limitations that apply to such deductions and to the importance of comparisons with similar results elsewhere.

George Slater, D.Sc.—Studies on the Rhone Glacier, 1927. The relationship between the average air-temperature and the rate of melting of the surface of the glacier.

Observations in Spitsbergen, 1921, suggested to the author the following tentative relationship between the average air temperature and the rate of melting of the ice:—

$$M = \tfrac{1}{2}\ (t - 32°F.)$$

where M = thickness (in feet) of ice melted per month (30 days) and t = average monthly temperature (°F.).

This would become 0.2 inches of ice melted per day for each

degree (F.) above zero under normal atmospheric conditions, wind and rain producing deviations from the normal. With the object of testing this relationship further, observations were conducted on the Rhone Glacier in 1927 over a period of twenty days.

A hole 3 feet deep was bored in the ice and a rod inserted from which a shaded standardised maximum and minimum thermometer was suspended. It was found that when hourly records of temperature were recorded the relationship given above was corroborated. As the recording of hourly temperatures, however, was impracticable, late morning or early afternoon temperatures only were recorded, in addition to the maximum and minimum. An inspection of the tables of Zürich air temperatures (*Das Klima der Schweiz*, 1864-1900) shows that the average of the maximum and minimum temperatures gives too high a value to the summer mean, whereas if the mean between the noon and maximum temperatures be first obtained, and then the mean calculated between this figure and the minimum temperature, the approximation to the true mean is more correct. This method was accordingly adopted. The average temperatures (July 26th to August 15th) were as follows:—maximum 50.6°F., minimum 34.5°F., noon 43.79°F., giving a daily average of 8.8°F. above 32°F. Assuming the rate of 0.2 inches of ice melted per day for each degree, the total amount melted would be 35.2 inches, a figure which is confirmed by actual measurement.

Correspondence

To the Editor, *The Meteorological Magazine*

The dry weather during 1929

The very dry weather here this year calls for a special report. The total rainfall up to June 30th was 12.63 inches, being 4.55 inches under the first six months' average for 44 years. The total number of "rainy" days (.01in. or more) was 85, being 25 under the average for the same. There was an "absolute" drought of 21 days in February and March. The longest drought ever recorded here.

But there were drier first six months previously, viz.:—

1895	...	8.53 inches—	"rainy" days	92.
1896	...	9.26 ,,	,, ,,	112.
1891	...	10.46 ,,	,, ,,	91.
1892	...	10.83 ,,	,, ,,	98.
1887	...	10.88 ,,	,, ,,	87.

The number of "rainy" days during the past six months (viz., 85) was the lowest ever recorded here.

It is fairly certain there will be a great shortage of water all over the country generally during the summer and autumn.

In the limestone districts of Clare, water is running short even now, but we never will run short of it here, there being any number of springs and streams that never run dry.

W. A. BENTLEY, Lieut.-Col.

Hurdlestown, Broadford, Co. Clare. July 1st, 1929.

Perplexities of Winter 1928-9

In his interesting notes under this heading Mr. Bonacina contrasts the freezing of the Serpentine and Cumberland lakes and suggests that the greater thickness of the ice on the latter may be due to being fed from cold mountain levels. I suggest it is due to smoke haze over London and also ice on deep water once formed thaws less in the sun. The ice was not gone from Serpentine till March 21st but all gone Wimbledon Park lake March 16th.

That this is due to smoke haze is borne out by the fact that in March, 1885, I failed to find ice in Cambridge fens so came up to Welsh Harp and skated there, although frost in Fens was much severer the sun was clearer.

STANLEY SINGLE.

17, *Kensington Palace Mansions, De Vere Gardens, W.8. June 22nd*, 1929.

Rain falling through drizzle

Heavy rain falling through drizzle was observed here at 17h. 5m. G.M.T. to-day. The drizzle lasted two to three minutes and ceased on the heavy rain diminishing in intensity. The sky was covered with 7/10 strato-cumulus at 1,500ft. and 3/10 alto-stratus, the gap in the low cloud through which the alto-stratus was observed being almost overhead.

A small pilot balloon liberated a few minutes after the occurrence of the phenomenon showed that the air was calm up to 2,000 ft. at which height cloud passed beneath it.

L. C. BURRIDGE.

R.A.F., Biggin Hill, Kent. June 12th, 1929.

Rainfall on July 4th

During the heavy rainfall which was experienced in East Anglian districts in the early morning of July 4th, an amount of 76.2mm. (3.00in.) was measured at Felixstowe between 4.45 a.m. and 8.00 a.m. B.S.T. The fall continued less intensely until 10.40 a.m. when a further 14.2mm. was measured, giving a total continuous fall of 90.4mm. (3.56in.).

This amount is 16.7 per cent. of the normal yearly fall, and

it is interesting to note that in these few hours as much rain fell as during the five complete months, February to June, this year.

T. W. VERNON JONES.

R.A.F., Felixstowe, Suffolk. July 6th, 1929.

Early Cherry Culture in England

With reference to the note on the "Early History of the south-west Monsoon" by Mr. G. M. Meyer in the June, 1929, Magazine, the following verse occurs in the *London Lickpenny* by John Lydgate about 1400-1450:—

> Then unto London I did me hie,
> Of all the land it beareth the prise.
> "Hot peascodes," one began to cry,
> "Strawberry ripe" and "Cherries in the rise."
> (on the bough.)

Therefore I presume it must be allowed that at this date cherries were sufficiently common to be hawked about the streets of London under the familiar cry as above.

RICHARD COOKE.

The Croft, Detling, Maidstone, Kent. June 27th, 1929.

Weather Lore

Mr. Glasspoole's interesting notes about a rain making superstition associated with a Welsh tarn calls to mind what is related by Gervase of Tilbury:—

"In the same parts (i.e., England) is Haveringmere. If any man sailing or rowing over the mere cry aloud:

> 'Phrut Haveringmere
> And alle those (that) over the fere.'

then forthwith a sudden tempest ariseth, sinking boat and man. . . . . Truly it is a great marvel that dumb waters should be capable of such indignation."

(Quoted by G. C. Coulton, *Social Life in Britain*, Camb. Univ. Press.)

Similar traditions were also attached during the Middle Ages to a small lake in the Alps near Lake Lucerne and to one in the Apennines between Bologna and Pistoia.

Mr. Coulton also gives some interesting "portents" of meteorological interest.

"And this same yer (1361) in the Ascencioun, even about midday, was seyn the Eclipse of the sunne: and ther folowed suche a newe droght that for default of rayn ther was grete barynes of corn, froyt (fruit) and hey, and in the same yere, the vj kalend of Juyn there fill a sangweyn rayne almoost like blood at Burgoyne; and a sangweyn crosse, fro morwe unto

Fig. 1.—Elm Tree, Chorley Wood, struck by lightning.

pryme was seyn and apperid at Boloigne in the eyr, the which meny a man sawe and after it mevid (moved) and fill in the myd see."

This latter marvel looks rather like an exaggerated description of the solar cross. This is supported by the fact that it appeared in the early morning, which would also account for the "sangweyn" colour.

CICELY M. BOTLEY.

17, *Holmesdale Gardens, Hastings. January 2nd*, 1929.

Trees damaged by Lightning

The following notes of trees recently struck by lightning may interest you. They were all damaged during the storm which broke over Chorley Wood on the afternoon of Friday, May 31st, 1929:—

(1) See photograph, Fig. 1. In Stag Lane (garden of King John's Farm, residence of Hon. Arthur Capell).

The highest branch of this tree was broken about 10 feet from the top, the thickness at this point being about 3 inches. Below this point the bark has been stripped from the branch for some 3 or 4 feet. From this point to the ground a strip of bark has been torn from the tree, averaging about 8 inches in width. A channel, which follows the turns in the grain of the tree, has been torn from the wood, leaving a frayed, but not singed, track some 3 inches wide and penetrating, at most $\frac{1}{4}$ inch. The fraying or splintering is much more marked in the upper part of the course. This channel would appear to mark the course of the spark. The bark has been pushed off. I have found no trace of burning.

(2) A deodar in the garden of Chorley Wood cedars. In this case the bark has been torn off in patches; the largest patch is some 25 feet from the ground and is very irregular, in part almost circling the limb. A branch was broken off. On the left side of this patch a deep channel has been torn for some 3 feet to a depth of some 1 to $1\frac{1}{2}$ inches, but no other channel is visible. On the other hand the wood is split with a long vertical crack which is visible on both sides of the trunk; through the crack splinters of wood protrude, thrust out from within. I climbed up and examined them. They suggest that the crack closed on them, nipping them as they were passing. I pulled one or two out. They vary from an inch to 6 inches long and have not been torn from the surface of the wood. Smaller patches of bark have been blown off at lower points on the trunk. Some no larger than a hand. The lowest about 6 feet from the ground.

(3) An ash tree near the "Swillet." The bark was stripped in a broad spiral band extending about 20 feet and ending below

at about 15 feet from the ground. The upper end finishes on the dead stump of a branch right among the foliage and 20 feet below the top of the tree. The surface of the wood is very much frayed and splintered. The bare patch is intermediate in form between the other two.

FRANCIS E. HILEY.

Limners, Stag Lane, Chorley Wood, Herts, June 15th, 1929.

NOTES AND QUERIES

The New Meteorological Observatory on the Jungfraujoch

In the *Meteorological Magazine* for May appeared a brief statement that work has begun on the building of a meteorological observatory on the Jungfraujoch. Dr. J. Maurer, Director of the Eidgenossische Meteorologische Zentralanstalt, Zurich, has kindly sent us further particulars, together with a photograph which we reproduce as the frontispiece of this month's magazine. The funds required have now been subscribed, but before the various buildings (astronomical observatory, meteorological pavilion and central building) can be erected it will be necessary to level the sites by blasting operations. The meteorological pavilion will be at a height of 3,570 metres (11,713ft.) on the rock summit of the "Sphinx"; the central building will be about 100 metres lower and will subsequently be connected with the pavilion by a gallery. Naturally a few alterations may be found to be necessary in the course of the work. The cost of the meteorological pavilion will be £8,000—£10,000 without instruments, that of the whole project £100,000 or more.

The observations of the meteorological observatory will include pressure, temperature, humidity, precipitation, wind direction and velocity, sunshine, duration and actinometric observations and also the principal elements of atmospheric electricity and optical and twilight phenomena.

Birthday Celebrations of Dr. G. Hellmann

We extend our congratulations and best wishes to Professor Dr. G. Hellmann on the occasion of his 75th birthday on July 3rd. Dr. Hellmann retired from the Directorship of the Prussian Meteorological Institute in 1922; he is known in this country chiefly for his researches into the history of meteorology and for his discussions of the climate and especially the rainfall of Germany. The Prussian Ministry for Science, Art and Education is marking the occasion by the establishment of a "Hellmann Medal," to be awarded to veteran observers at stations of the Prussian Meteorological Service in recognition of long service.

The British East African Meteorological Service*

The Joint Meteorological Service for British East Africa was inaugurated on January 1st, 1929, and covers the Territories of Kenya, Uganda, Zanzibar, Tanganyika and Northern Rhodesia. As this region includes the headwaters of the Nile, Egypt and the Sudan are also interested in the new Service and are giving financial support. Mr. Walter, formerly Director of the Meteorological and Statistical Services of the South Indian Ocean, and now Statistician to the Governor's Conference, is acting as Director.

Five First Order stations are being set up, at Kabete in Nairobi, Kenya Colony; at Port Bell in Uganda (in connexion with a base for the Air Services); at Tabora in Tanganyika Territory; at Zanzibar; and at Mazabuka in Northern Rhodesia. At these stations, in addition to the usual meteorological observations, the magnetic elements and atmospheric electric potential will be measured, and pilot balloon ascents will be made. In addition there will be about 40 Second Order Telegraphic Stations observing twice daily. The publications of the new Service will include a monthly bulletin of observations, a series of annals in which records, as far back as can be obtained, will be collected and published and a series of memoirs dealing with special investigations.

Lake Moeris and Climatic Changes

Lake Moeris is the name given to an extensive lost lake in the Faiyum depression southwest of Cairo, now represented only by the small Birket Qarum. The history of this lake has long constituted one of the great problems of Egyptology, but the main lines now appear to have been definitely laid down in an important paper by Miss G. Caton-Thompson and Miss E. W. Gardner, published in the *Geographical Journal* for January, 1929. The paper is too long to summarise in detail, but it appears that the principal lake Moeris was glacial in age, and was maintained by a branch from the Nile, then at a high level. The gradual decline of the lake until it nearly dried up, its resuscitation in Neolithic times, and its final decline to the present small remnant, make an interesting story. The bearing on past climates is complicated by the intermittent connection with the Nile, but the authors apparently read the history as follows:—

From about 18,000 to 14,000 B.C., when the lake was high,

*Colony and Protectorate of Kenya. The British East African Meteorological Service. Memoirs 1—Note on the Inauguration of a Joint Meteorological Service for British East African Territories. Under the Direction of A. Walter, Statistician to the Governor's Conference, Nairobi, 1929.

was a "pluvial period" corresponding with the latter half of the Wurm Glaciation of Europe. From about 13,000 to 9,000 B.C., when the lake was dry or nearly so, was a dry period representing the Achen Oscillation. About 9,000 to 6,000 B.C.—the period of the Neolithic lake—was again wet, especially about 7,500 B.C., and this has been followed by progressive desiccation into historic times. The archæological evidence, however, indicates that there was a prolonged period during which the lake, although isolated from the Nile, was able to maintain an almost uniform level from a little after 5,000 until 3,000 B.C., after which it shrank rapidly. The period of constant level coincides in time with the moist Atlantic period of Europe, while the subsequent shrinkage fits in with the dry Sub-boreal period.

In Europe there was a return of moister conditions about 850 B.C. This the authors ignore, assuming that the level of Moeris fell uniformly throughout the historic period until it reached its present size. Their ingenious explanation of the evidence of Herodotus, who visited the Faiyum about 450 and reported that the depression was occupied by a large lake, is not entirely convincing. Again, according to their theory the structure at Dimai (about 250 B.C.) could not be a quay, because it ended on dry land, but with its wide shallow steps ending in a sheer drop of 6ft. it is difficult to see what other purpose it could serve. A temporary rise of the lake in the first millennium B.C. would fit these two pieces of evidence very well, but one gathers from the paper that there is even more cogent evidence against such a rise.

C. E. P. Brooks.

An Observer's Experiences

News has been received of the death at the age of 73 of William Delday, observer at the climatological and anemometrical station at Deerness, Orkney, since 1919, and assistant observer since 1891, when the meteorological instruments were first placed at Deerness on transfer from their former situation at Swanbister. Mr. Delday was not only a faithful and conscientious observer for the Meteorological Office, but he had a great local reputation as custodian of the weather records, and was no doubt frequently called upon for information regarding the weather. Moreover, he was a poet and writer of sorts, and it is thought that readers may be interested in the following specimen of his writing, which has been rescued from the official files.

Extract from a letter dated March 27th, 1928, describing observing experiences after an accident.

"I did not want our splendid Orcadian record to cease, so I kept the record in circumstances which would have deterred most people from doing so. I underwent an operation in Kirkwall

and the doctor wanted me to remain in the city, I told him I could not for I had to keep the weather record in Deerness. I slipped on the ice and broke my lantern, and hurt my knee when going to read the instruments at the school, and was so lame that I had to hire a man to work the horses and he spoiled a first-prize mare. She would not work, so in helping to train a beautiful mare I got my shoulder dislocated. The doctors came and put my arm back again into the socket and bade me to remain in bed. I got a neighbour to come and set the vernier and I read the instruments and dictated the readings to be written. My left arm being lame and my right hand tied to my belly, I kept the record. When my right arm was released, I was changing the sunshine card and coming home I fell and broke my neck. Most people would have lain and not have tried to mend their neck. But I turned on my face and placed my brow against the dyke from the top of which I had fallen, and got hold of one of the stones in the dyke and I pulled till I got my neck in a little better shape. O! the pain. But some more strength came to me and I pulled till my head came into its right position.

Then by gripping the fence at my side, I got on my feet and moved slowly home supporting my head with my hands. When I came into the house, those there never saw my face so white. I stood and ate a biscuit and drank a cup of tea, I could not sit down. I leaned against the wall and then lay down dressed as I was on my bed. They laid the bed clothes over me, I could not lay them myself. I rose at 21h. and looked at the sky and guessed the state of the instruments at the school. I had read the minimum in the morning and I read the maximum next morning and the barometer had been fairly steady. That was the only time while I was reading these instruments that I was not there near to the proper time. I was down on the morrow at 9h. and read the instruments, but I did not get my coat off for two weeks. My neck troubles me yet."

St. Swithin's Day

A passing reference to the legend of St. Swithin's day may be looked for each year in the press, but it is doubtful if the interest is maintained throughout the 40-day period: if it were, the value of the prognostic would undoubtedly go down. The following figures are based on an examination of a series of daily rainfall measurements at Brixton, 1871-1910. (A "wet" day is one on which ·01 in. of rain or more was measured.)

In these 40 years St. Swithin's day was dry 23 times, wet 17 times; the average total rainfall in the 40-day period was 2·97 in., falling on approximately 17 days. These figures agree well with what one would expect from consideration of the *Book*

of Normals of Meteorological Elements for the British Isles, and therefore the material is evidently a good enough sample. Considering separately the years when St. Swithin's day was dry and when it was wet, one gets average values which may be tabulated as follows:—

ST. SWITHIN'S DAY

Dry	Wet
in the next 40 days—	
23 dry days, 17 wet	24 dry days, 16 wet
Total rainfall 3·29 in.	Total rainfall 2·54 in.
Longest dry spell 8 days	Longest dry spell 10 days
,, wet ,, 5 ,,	,, wet ,, 5 ,,
Comparatively large departures from these averages are likely. 4:1 chance of July 31 and Aug. 1 being dry.	Comparatively small departures from these averages are likely. 5:1 chance of Aug. 4, 7 and 14 being dry.

No particular day seems to be indicated as wet except August 24 (the 40th day) after a wet St. Swithin's day with a 12:5 chance of "wet." Hence one can claim a statistical justification, though a slight one, for saying that if it rains on St. Swithin's day it will rain 40 days after—with an ambiguity equal to that of some of the sayings of the classical oracles. The legend of St. Swithin's day is usually explained as a reference to the greater rainfall of July and August in this country, compared with that of the previous few months, and therefore as a "key" day, one July day might be expected to be as good as the next. A cursory search produced a list of 12 key days, five in June, six in July, one in August, mostly saints' days, and all supposed to serve as a guide to the character of the weather during the following six weeks or so.

Although weather maxims generally prove on investigation to be of little value to the forecaster, they form an interesting study. The Abbé Moreux gives a large selection of "meteorological proverbs" in the second edition of one of his books on weather forecasting, together with a reply to critics who had objected to the inclusion of such proverbs in the first edition.

One of the Abbé's July proverbs may be quoted:

"S'il pleut à la Visitation (July 2),
Pluie à discrétion."

S. T. A. MIRRLEES

Frequency of Rain-days

Mr. F. E. Wright has forwarded a table showing the mean annual frequency of daily rainfall amounts within specified limits as recorded at Sutton, to the south of London, during

the last 20 years. As values of this character are not always readily available they are reproduced below :—

Mean annual number of days of rainfall within specified limits, Sutton, 1909-28.

Rainfall inch	Mean No. of days
.01 — .03	43
.04 — .49	116.5
.50 — .74	7.9
.75 — .99	2.8
1.00 — 1.24	.9
1.25 — 1.49	.3
1.50 — 1.74	.4
1.75 — 1.99	.1
over 2.00	.1
	172.

The mean annual rainfall during this period was 29.35in.

At Camden Square (north London) the frequency of days with similar amounts during the 45 years 1858-1902 was in close agreement. The corresponding values for the last eight rows of the table were 5.9, 2.0, 0.7, 0.4, 0.1, 0.1, 0.1 and 161.*

The two wettest days at Sutton during the last 20 years were May 31st, 1911, and July 9th, 1923, with 2.40in. and 2.15in. respectively. In 1917 a fall of 1.87in. on July 30th was followed by one of 1.85in. on August 1st.

J. GLASSPOOLE.

Reviews

Geological Climates, by W. B. Scott. *Fossil marine faunas as indicators of climatic conditions*, by Edwin Kirk. Reprints from the Smithsonian Report for 1927, pp. 271-287 and 299-307.

Neither of these papers is heartening. In the first the President of the Geological Society of America reviews the various theories which have been put forward to account for geological changes of climate, and after a process of elimination arrives at the conclusion that we must look to changes in the sun. This theory is only acceptable because it is impossible to disprove; the fact that it is also impossible to prove is a minor disadvantage. Then Mr. Kirk cuts most of the ground from under our feet by pointing out that marine animals do not give reliable indications of past climates, and hence many of our ideas about the latter have no basis in fact. The whole subject of palæo-

*See *British Rainfall* 1902. p. 35. Frequencies of daily amounts at Kew are given in *London Q.J.R. Meteor. Soc.* 36, 1910, p. 319, based on 63 years' observations. In this case frequencies are given for each month as well as for the year.

climatology, like several other sciences, is passing through a period of crisis, in which old fundamental beliefs are breaking up while no new fundamental principles have yet emerged.

Agroklimatische Verhältnisse Russlands. By Prof. W. v. Poletika. Reprinted from Der Kulturtechniker, Zeitschrift der Deutschen Kulturtechnischen Gesellschaft, xxxi, 1928, No. 6.

Over the enormous area of Russia and Siberia there are very few mountains, and the most important factor in the economic life is the climate. In this interesting paper Professor W. v. Poletika discusses the influence of the climate upon agriculture. Zonal arrangement, resulting from solar control, is developed to an extent unknown anywhere else, and is shown not only in temperature, but in rainfall. Almost a quarter of the whole area is waste, in the north because of the lack of warmth, in the south because of the lack of rainfall, and even in the most favoured localities the lack of spring rainfall and the short vegetation season limit the possibilities of agriculture.

Books Received

Die Ausbreitung von Luftdruckwellen über Europa. By L. Weickmann. (Beitr. Geophys., Leipzig, XVII, 1927, pp. 332-9.)

Das Wellenproblem der Atmosphäre. By L. Weickmann. (Met. Zs., 1927, pp. 241-53.)

Il Clima dei Colli Euganei e di Padova. By Guiseppe Crestani. (Ufficio Idrografico R. Magistrato alle acque, Venezia.) In this paper the author is mainly concerned with the temperature observations at the two stations Padova and Venda. Padova is on the plain at a height of 16m. and the observations discussed extend over the period 1920-6, whereas Venda is near the top of the Colli Euganei at a height of 579m. and the observations extend from 1916-26.

La Lluvia en Venezuela; anos de 1925 y 1926. By Ernesto Sifontes, Caracas, 1928.

Jaarboek, Koninklijk Nederlandsch Meteorologisch Instituut, 1926, A. Meteorologie, B. Aard-Magnetisme (No. 98), Utrecht, 1927.

Ergebnisse Aerologischer Beobachtungen, 1926. K. Ned. Meteor. Inst. (No. 106A). Utrecht, 1927.

Onweders, Optische Verschijnselen, enz. in Nederland. Naar Vrijwillige Waarnemingen in 1925. Deel XLVI. K. Ned. Meteor. Inst. (No. 81). Amsterdam, 1927.

Royal Alfred Observatory, Mauritius; Annual Report, 1927, and Results of magnetical and meteorological observations for July to December, 1927. Port Louis, 1927.

Bollettino Meteorologico della Cirenaica, 1926 (Riassunto delle osservazioni). Governo della Cirenaica, No. 7. Tripoli, 1928.

Bollettino Meteorologico della Tripolitania, 1926 (Riassunto delle osservazioni). Governo della Tripolitania, No. 8. Tripoli, 1928.

Anales del Observatorio Nacional de San Bartolomé en los Andes Colombianos. Observaciones meteorologicas de 1926. Bogota, 1928.

News in Brief

Dr. L. F. Richardson, F.R.S., F.Inst.P., who is in charge of the Physics Dept., Westminster Training College, London, and was formerly Superintendent of Eskdalemuir Observatory, has been appointed Principal of Paisley Technical College.

Professor Henrique Morize has resigned the post of Director of the National Observatory, Rio de Janeiro, which he has held since 1921. He is succeeded by Señor Sodré da Gama.

The Norwegian paper *Tidens Tegn* for May 28th, 1929, contains an account of the flight carried out by the Junkers pilot, Neuenhofen, on May 26th, in which he set up the altitude record of 12,500 metres. To his great astonishment Neuenhofen encountered sharp squalls at 11,000 metres. The temperature at this altitude was – 50°C. and the lowest pressure recorded was 173mb.

A paper on "Extremes of Rainfall over the British Isles" was read on July 2nd by Dr. J. Glasspoole at the summer meeting of the British Waterworks Association, which was held at Portsmouth from July 2nd to 5th.

Errata

May, 1929, p. 101, line 45, and June, 1929, p. 128, line 45, *for* "the average 1811-1915" *read* "the average 1881-1915."

The Weather of June, 1929

June was a relatively cool month in spite of an excess of sunshine in most districts. The total rainfall for the month was also below the normal except in Scotland and west Ireland. The first day of the month was generally cloudy and warm though by the evening rain was spreading in from the west. Dungeon Ghyll (Westmorland) had as much as 1.40in. and Ford (Argyll) 1.19in. during the night, but the amounts measured elsewhere were generally slight. For the rest of the first week an elongated belt of low pressure was maintained from the Atlantic across the country and rain fell on most days though there were many bright periods. Heavy rain occurred on the 4th and 6th; 1.11in. was measured at Swingfield (Dover) on the 4th. Thunderstorms were experienced in the south on the 4th and in the north on the

6th and 8th. An anticyclone spreading in from the Azores on the 9th gave an interval of mainly bright weather and temperature, which had been rather low on the whole rose generally to above 70°F. on the 11th and 12th, 76°F. being recorded at Renfrew, Hull and Lympne. The 9th, 10th and 11th were three very sunny days generally when more than 15hrs. of bright sunshine were registered at a few stations and as much as 15.8hrs. at Deerness (Orkneys) on the 9th. Heavy rain, however, fell in Tiree and northwest Ireland on the 11th owing to a depression over the Atlantic; Blacksod Point had 1.42in. On the 12th a depression from the Bay of Biscay gave general rain over England, the heaviest falls being in the west. This was followed by a further period of showery weather with considerable periods of sunshine but a rather low temperature. Thunderstorms were frequent in the north on the 13th and 14th. Except in the north where useful showers of rain were experienced between the 18th and 24th, mainly dry sunny weather set in on the 17th and persisted to nearly the end of the month. Temperature rose quickly, maxima of over 70°F. were reported at most places on the 18th and 19th, while 83°F. occurred at Greenwich and 82°F. at Norwich on the 19th. On these two days over 15hrs. sunshine were reported locally. Temperature again rose over 70°F. on the 23rd. After this the winds veered to north with a corresponding drop in temperature, ground frosts occurring at a few places round the 26th. The weather remained cool in the east until the 30th but in the west it turned warm, 72°F. was recorded at Kilmarnock on the 27th and 75°F. at Mallarany on the 28th. Rothesay had 16.1hrs. sunshine on the 25th and many other places over 15hrs. between the 25th and 29th. A depression over the Bay of Biscay brought moderate rain to southern England on the 29th and 30th.

Pressure was below normal over northwest and central Europe and the North Atlantic, the greatest deficit being about 5mb. at Stockholm, and above normal over southwest Europe, Spitsbergen, northwest Iceland, Newfoundland and Bermuda, the greatest excess being 3.5mb. at Stykkisholm. Temperature was generally below normal over the whole of west Europe with the exception of Portugal and northeast Sweden, while rainfall was mainly in excess in the north but deficient in the central and western countries.

On the night of May 31st to June 1st a waterspout broke over the Bernese Jura and destroyed the crops in the district of Vendlincourt. Violent thunderstorms were also reported from Canton Vaud (Switzerland) on the 10th and in the neghbourhood of Brussels on the 12th, much damage being done to the crops, trees and vineyards. The heat wave in Spain came to an end on the 12th, when there were heavy falls of rain and hail. Numerous thunderstorms occurred in Yugoslavia during the month. Forest fires broke out in various parts of the Riviera

about the 25th. After a month of sunshine and hot weather temperature fell rapidly in the neighbourhood of Milan on the 26th; storms were reported in many parts of the country and snow fell on the high peaks of the Alps and Apennines.

A devastating hailstorm swept over most of Durban on the evening of the 4th. No serious casualties occurred but much material damage was done, roofs collapsing under the weight of the hail. Many of the lumps of ice were said to be larger than a tennis ball.

Forest fires fanned by strong winds and favoured by the drought occurred in northern Japan and Sakhalin at the beginning of the month. Heavy rain fell in Yemen (Arabia) about the 10th so that the River Bana was in flood in the Aden Protectorate. A heat spell was experienced in the Punjab during the first part of the month, maximum temperatures on most days being above 110°F. The monsoon set in definitely in Bombay on the 6th, when nearly 7in. of rain fell. In Calcutta it broke with comparative gentleness on the 15th. In Assam and western Burma it broke with violence causing serious floods, which destroyed many cattle and much of the crops. About the 20th fine weather was experienced in Assam. By the 30th the floods had subsided considerably.

High temperatures were experienced in the northeastern part of the United States during the first days and a heat wave lasting nearly a fortnight set in about the 13th. The heat was accompanied by high humidity. A thunderstorm followed by cool northwest winds occurred on the 25th. Intense heat was also experienced in the southern states and a temperature of 118°F. was recorded both at Phœnix and Yuma in Arizona on the 24th. A hurricane caused damage to sugar plantations in northern Venezuela about the 23rd and heavy storms also occurred in northern Chile.

Icebergs were more numerous than usual on the Grand Banks of Newfoundland.

The special message from Brazil states that the rainfall was deficient over the whole country with 2.13in., 0.91in. and 1.50in. below normal in the northern, central and southern districts respectively. Eight anticyclones passed across the country and the continental depressions often spread southwards. Crops were doing well in the favourable weather despite the scarcity of precipitation, though there were some losses in the south owing to frosts. At Rio de Janeiro pressure was equal to normal and temperature 0.2°F. below normal.

Rainfall, June, 1929.—General Distribution

England and Wales	78	per cent. of the average 1881-1915.
Scotland	124	
Ireland	83	
British Isles	91	

Rainfall: June, 1929: England and Wales

Co.	Station	In.	Per-cent of Av.	Co.	Station	In.	Per-cent. of Av.
Lond.	Camden Square.....	1·29	64	*Leics.*	Belvoir Castle.....	1·57	82
Sur.	Reigate, The Knowle...	1·57	81	*Rut.*	Ridlington.....	1·20	...
Kent.	Tenterden, Ashenden...	1·09	57	*Linc.*	Boston, Skirbeck.....	1·59	87
,, .	Folkestone, Boro. San..	1·58	...	,, .	Lincoln.....	1·25	62
,, .	Margate, Cliftonville...	1·05	60	,, .	Skegness, Marine Gdns	·70	39
,, .	Sevenoaks, Speldhurst	1·20	...	,, .	Louth, Westgate.....	1·20	56
Sus.	Patching Farm.....	2·54	126	,, .	Brigg, Wrawby St....	·74	...
,, .	Brighton, Old Steyne..	2·28	127	*Notts.*	Worksop, Hodsock.....	·82	41
,,	Heathfield, Barklye....	1·65	79	*Derby.*	Derby, L. M. & S. Rly.	1·17	52
Hants.	Ventnor, Roy. Nat. Hos.	1·57	86	,, .	Buxton, Devon Hos....	1·95	61
,, .	Fordingbridge, Oaklnds	1·20	65	*Ches.*	Runcorn, Weston Pt...	1·73	67
,, .	Ovington Rectory.....	...	...	,, .	Nantwich, Dorfold Hall	1·78	...
,, .	Sherborne St. John.....	1·30	61	*Lancs.*	Manchester, Whit. Pk.	1·01	38
Berks.	Wellington College.....	·93	43	,, .	Stonyhurst College.....	1·77	58
,, .	Newbury, Greenham...	1·43	66	,, .	Southport, Hesketh Pk	1·22	56
Herts.	Welwyn Garden City...	·51	...	,, .	Lancaster, Strathspey	1·66	...
Bucks.	High Wycombe.....	1·30	67	*Yorks.*	Wath-upon-Dearne.....	1·27	57
Oxf. .	Oxford, Mag. College..	·99	46	,, .	Bradford, Lister Pk....	·90	38
Nor.	Pitsford, Sedgebrook...	1·05	54	,, .	Oughtershaw Hall.....	2·84	...
,, .	Oundle.....	·75	...	,, .	Wetherby, Ribston H.	1·60	76
Beds.	Woburn, Crawley Mill	·87	44	,, .	Hull, Pearson Park.....	1·45	70
Cam.	Cambridge, Bot. Gdns.	·84	40	,, .	Holme-on-Spalding.....	·81	...
Essex.	Chelmsford, County Lab	·58	31	,, .	West Witton, Ivy Ho.	1·49	...
,, .	Lexden Hill House....	·79	...	,, .	Felixkirk, Mt. St. John	1·86	85
Suff.	Hawkedon Rectory.....	1·18	57	,, .	Pickering, Hungate....	...	...
,, .	Haughley House.....	·47	...	,, .	Scarborough.....	1·30	71
Norf.	Norwich, Eaton.....	·80	41	,, .	Middlesbrough.....	2·14	113
,, .	Wells, Holkham Hall	1·90	97	,, .	Baldersdale, Hury Res.	1·31	...
,, .	Little Dunham.....	1·23	55	*Durh.*	Ushaw College.....	1·60	74
Wilts.	Devizes, Highclere.....	1·40	62	*Nor.*	Newcastle, Town Moor	1·50	69
,, .	Bishops Cannings.....	1·41	58	,, .	Bellingham, Highgreen	3·06	...
Dor.	Evershot, Melbury Ho.	1·94	85	,, .	Lilburn Tower Gdns....	1·70	...
,, .	Creech Grange.....	1·73	...	*Cumb.*	Geltsdale.....	2·20	...
,, .	Shaftesbury, Abbey Ho.	1·59	69	,, .	Carlisle, Scaleby Hall	2·52	100
Devon.	Plymouth, The Hoe....	2·64	122	,, .	Borrowdale, Seathwaite	5·77	89
,, .	Polapit Tamar.....	2·42	113	,, .	Borrowdale, Rosthwaite	3·76	...
,, .	Ashburton, Druid Ho.	...	...	,, .	Keswick, High Hill.....	1·60	...
,, .	Cullompton.....	2·40	113	*Glam.*	Cardiff, Ely P. Stn....	2·31	93
,, .	Sidmouth, Sidmount...	2·31	110	,, .	Treherbert, Tynywaun	5·82	...
,, .	Filleigh, Castle Hill....	2·80	...	*Carm.*	Carmarthen Friary.....	2·45	85
,, .	Barnstaple. N. Dev. Ath.	2·61	117	,, .	Llanwrda.....	3·31	97
Corn.	Redruth, Trewirgie.....	3·05	123	*Pemb.*	Haverfordwest, School	1·95	72
,, .	Penzance, Morrab Gdn.	3·31	149	*Card.*	Aberystwyth.....	3·87	...
,, .	St. Austell, Trevarna...	3·33	128	,, .	Cardigan, County Sch.	2·12	...
Soms.	Chewton Mendip.....	1·82	61	*Brec.*	Crickhowell, Talymaes	3·20	...
,, .	Long Ashton.....	2·22	...	*Rad.*	Birm W. W. Tyrmynydd	3·55	109
,, .	Street, Millfield	1·91	...	*Mont.*	Lake Vyrnwy.....	3·51	111
Glos.	Cirencester, Gwynfa....	1·35	56	*Denb.*	Llangynhafal.....	2·38	...
Here.	Ross, Birchlea.....	1·40	64	*Mer.*	Dolgelly, Bryntirion...	5·06	145
,, .	Ledbury, Underdown..	1·33	59	*Carn.*	Llandudno.....	2·04	100
Salop.	Church Stretton.....	2·94	121	,, .	Snowdon, L. Llydaw 9	...	...
,, .	Shifnal, Hatton Grange	1·94	87	*Ang.*	Holyhead, Salt Island	1·36	63
Worc.	Ombersley, Holt Lock	1·86	82	,, .	Lligwy.....	1·64	...
,, .	Blockley.....	1·36	...	*Isle of Man*			
War.	Farnborough.....	1·85	78		Douglas, Boro' Cem....	2·06	85
,, .	Birminghm, Edgbaston	1·96	84	*Guernsey*			
Leics.	Thornton Reservoir....	1·55	72		St. PeterP't. GrangeRd.	2·39	129

Rainfall: June, 1929: Scotland and Ireland

Co.	Station	In.	Percent of Av.	Co.	Station	In.	Percent of Av.
Wigt.	Stoneykirk, Ardwell Ho	2·29	94	*Suth.*	Loch More, Achfary...	6·92	187
,, .	Pt. William, Monreith	1·94	...	*Caith.*	Wick.....	3·30	183
Kirk.	Carsphairn, Shiel.....	3·02	...	*Ork.*	Pomona, Deerness.....	3·30	179
,, .	Dumfries, Cargen.....	2·90	104	*Shet.*	Lerwick	2·17	122
Dumf.	Eskdalemuir Obs.....	4·43	141	*Cork.*	Caheragh Rectory.....	3·46	...
Roxb.	Branxholm	2·03	90	,, .	Dunmanway Rectory...	2·47	71
Selk.	Ettrick Manse.....	...	...	,, .	Ballinacurra.....	1·41	54
Peeb.	West Linton.....	2·72	...	,, .	Glanmire, Lota Lo.....	1·48	55
Berk.	Marchmont House.....	2·12	92	*Kerry.*	Valentia Obsy.....	3·40	106
Hadd.	North Berwick Res.....	1·93	111	,, .	Gearahameen.....	4·10	...
Midl.	Edinburgh, Roy. Obs.	2·49	135	,, .	Killarney Asylum.....	1·77	61
Ayr.	Kilmarnock, Agric. C.	3·26	148	,, .	Darrynane Abbey.....	2·97	95
,, .	Girvan, Pinmore..	3·21	111	*Wat.*	Waterford, Brook Lo...	2·66	99
Renf.	Glasgow, Queen's Pk..	2·99	129	*Tip.*	Nenagh, Cas. Lough...	1·40	57
,, .	Greenock, Prospect H.	3·99	121	,, .	Roscrea, Timoney Park	1·57	...
Bute.	Rothesay, Ardencraig.	3·55	116	,, .	Cashel, Ballinamona...	1·64	71
,, .	Dougarie Lodge.....	3·35	...	*Lim.*	Foynes, Coolnanes.....	·99	38
Arg.	Ardgour House	6·38	...	,, .	Castleconnel Rec.....	1·58	...
,, .	Manse of Glenorchy...	5·45	...	*Clare.*	Inagh, Mount Callan...	2·40	...
,, .	Oban.....	3·99	...	,, .	Broadford, Hurdlest'n.	2·03	...
,, .	Poltalloch	5·19	170	*Wexf.*	Newtownbarry	2·43	...
,, .	Inveraray Castle...	6·32	160	,, .	Gorey, Courtown Ho...	2·26	93
,, .	Islay, Eallabus.....	4·11	157	*Kilk.*	Kilkenny Castle.....	1·95	80
,, .	Mull, Benmore.....	9·30	...	*Wic.*	Rathnew, Clonmannon	1·39	...
,, .	Tiree	3·09	...	*Carl.*	Hacketstown Rectory..	2·00	71
Kinr.	Loch Leven Sluice.....	1·77	81	*QCo.*	Blandsfort House.....	1·99	77
Perth.	Loch Dhu.....	4·30	103	,, .	Mountmellick.....	1·47	...
,, .	Balquhidder, Stronvar	2·78	...	*KCo.*	Birr Castle.....	1·69	73
,, .	Crieff, Strathearn Hyd.	2·08	79	*Dubl.*	Dublin, FitzWm. Sq...	1·52	78
,, .	Blair Castle Gardens...	1·55	78	,, .	Balbriggan, Ardgillan.	1·31	65
,, .	Dalnaspidal Lodge.....	2·76	86	*Me'th.*	Beauparc, St. Cloud...	2·12	...
Angus.	Kettins School.	1·63	87	,, .	Kells, Headfort.....	2·95	111
,, .	Dundee, E. Necropolis	1·96	109	*W.M.*	Moate, Coolatore.....	2·40	...
,, .	Pearsie House.....	2·07	...	,, .	Mullingar, Belvedere..	2·00	77
,, .	Montrose, Sunnyside...	1·73	104	*Long.*	Castle Forbes Gdns.....	1·97	76
Aber.	Braemar, Bank...	1·47	75	*Gal.*	Ballynahinch Castle...	3·89	110
,, .	Logie Coldstone Sch....	1·60	82	,, .	Galway, Grammar Sch.	1·71	...
,, .	Aberdeen, King's Coll.	1·84	108	*Mayo.*	Mallaranny.....	3·44	...
,, .	Fyvie Castle.....	2·61	...	,, .	Westport House.....	1·37	51
Mor.	Gordon Castle.....	2·41	118	,, .	Delphi Lodge.....	5·76	...
,, .	Grantown-on-Spey.....	...	...	*Sligo.*	Markree Obsy.....	2·89	96
Na.	Nairn, Delnies	1·76	100	*Cav'n.*	Belturbet, Cloverhill...	2·62	107
Inv.	Kingussie, The Birches	1·70	...	*Ferm.*	Enniskillen, Portora...	2·44	...
,, .	Loch Quoich, Loan.....	6·00	...	*Arm.*	Armagh Obsy.....	1·85	78
,, .	Glenquoich	7·41	151	*Down.*	Fofanny Reservoir.....	2·82	...
,, .	Inverness, Culduthel R.	1·80	...	,, .	Seaforde.....	2·16	78
,, .	Arisaig, Faire-na-Squir	4·22	...	,, .	Donaghadee, C. Stn....	2·61	112
,, .	Fort William.....	4·64	...	,, .	Banbridge, Milltown...	2·31	...
,, .	Skye, Dunvegan.....	3·70	...	*Antr.*	Belfast, Cavehill Rd...	2·94	...
R & C.	Alness, Ardross Cas ...	1·68	74	,, .	Glenarm Castle.....	2·58	...
,, .	Ullapool.....	3·49	...	,, .	Ballymena, Harryville	3·05	105
,, .	Torridon, Bendamph...	5·11	125	*Lon.*	Londonderry, Creggan	3·82	135
,, .	Achnashellach.....	5·29	...	*Tyr.*	Donaghmore.....	3·11	...
,, .	Stornoway.....	3·26	141	,, .	Omagh, Edenfel.....	2·73	97
Suth.	Lairg.....	2·64	...	*Don.*	Malin Head.....	3·44	...
,, .	Tongue	3·75	183	,, .	Dunfanaghy.....	3·74	...
,, .	Melvich.....	5·20	268	,, .	Killybegs, Rockmount.	4·26	112

Climatological Table for the British Empire, January, 1929.

STATIONS	PRESSURE		TEMPERATURE							Relative Humidity.	Mean Cloud Am'nt	PRECIPITATION			BRIGHT SUNSHINE	
	Mean of Day M.S.L.	Diff. from Normal	Absolute		Mean Values				Mean Wet Bulb			Am'nt	Diff. from Normal	Days	Hours per day	Percentage of possible
			Max.	Min.	Max.	Min.	½ max. and min.	Diff. from Normal								
	mb.	mb.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	%	0—10	in.	in.			
London, Kew Obsy.	1025·7	+ 8·1	51	24	38·8	31·8	35·3	− 3·6	32·1	87	8·7	0·73	− 1·03	10	1·0	12
Gibraltar	1022·1	+ 0·9	67	38	59·7	50·6	55·1	+ 0·3	49·5	78	5·9	0·57	− 4·49	8	..	..
Malta	1019·4	+ 1·8	63	43	55·1	47·7	51·4	− 3·9	46·3	70	6·5	1·28	— 1·93	16	5·5	55
St. Helena	1010·9	+ 0·9	70	57	64·9	58·4	61·5	− 3·0	59·4	97	9·7	1·82	− 1·15	22	..	..
Sierra Leone	1008·4	— 2·4	92	68	86·3	72·6	79·5	− 1·8	74·6	80	1·8	0·00	− 0·41	0	..	..
Lagos, Nigeria	1011·6	+ 1·7	89	68	87·5	74·1	80·8	− 0·1	73·2	78	7·3	0·02	− 1·05	1	..	..
Kaduna, Nigeria	1016·4	+ 4·8	97	..	86·7	..	..	..	58·7	47	..	0·00	0·00	0	..	..
Zomba, Nyasaland	1007·6	+ 0·2	86	62	78·7	64·9	71·8	— 1·0	..	84	9·0	17·98	+ 6·88	25	..	..
Salisbury, Rhodesia	1007·8	— 0·6	85	55	76·7	60·2	68·5	— 1·2	62·8	76	8·0	11·98	+ 4·51	21	5·3	40
Cape Town	1013·4	0·0	102	57	82·3	62·6	72·5	+ 2·6	64·0	64	1·7	0·00	− 0·68	0	..	..
Johannesburg	1011·4	+ 0·6	88	52	76·6	57·0	66·8	+ 0·3	58·9	76	5·8	3·78	− 2·39	14	7·4	54
Mauritius	1012·5	+ 0·6	88	70	83·7	72·9	78·3	— 1·0	74·7	75	7·2	8·60	+ 0·84	21	7·6	58
Bloemfontein	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Calcutta, Alipore Obsy.	1014·6	— 0·6	84	50	79·4	59·3	69·3	+ 2·9	59·7	85	4·6	1·17	+ 0·83	2*	..	..
Bombay	1013·0	— 0·6	92	54	83·8	66·3	75·1	— 0·2	63·6	71	2·1	0·63	+ 0·53	1*	..	..
Madras	1012·2	— 1·9	86	64	83·9	68·5	76·2	+ 0·1	71·6	89	3·3	1·87	+ 0·48	2*	..	..
Colombo, Ceylon	1011·6	+ 0·1	87	63	84·9	70·7	77·8	— 1·3	73·7	74	3·2	6·61	+ 3·11	10	9·7	82
Hongkong	1019·0	— 0·8	74	52	66·9	59·4	63·1	+ 2·9	58·2	74	6·3	0·93	− 0·44	8	5·3	49
Sandakan	..	..	90	72	85·8	73·6	79·7	— 0·1	75·8	84	..	5·88	— 12·57	7	..	..
Sydney, N.S.W.	1008·5	— 4·0	106	61	80·8	67·8	74·3	+ 2·6	67·2	61	5·5	0·32	— 3·41	6	7·6	54
Melbourne	1009·1	— 3·8	101	48	78·4	56·3	67·3	— 0·2	59·0	56	6·0	1·36	— 0·49	11	7·4	51
Adelaide	1011·5	— 1·5	104	51	81·6	60·2	70·9	— 3·0	58·4	38	5·4	0·45	— 0·28	9	9·5	67
Perth, W. Australia	1014·4	+ 1·9	100	51	84·1	61·5	72·8	— 1·1	60·9	43	1·8	0·30	— 0·04	2	11·9	86
Coolgardie	1012·3	+ 0·9	107	47	91·6	59·0	75·3	— 2·1	59·3	39	2·1	0·37	— 0·10	2	..	..
Brisbane	1008·6	— 2·7	102	65	88·9	71·1	80·0	+ 2·8	73·0	66	6·1	4·60	— 1·67	7	9·0	70
Hobart, Tasmania	1003·7	— 6·6	82	43	70·6	52·6	61·6	— 0·7	53·9	57	6·6	2·12	+ 0·33	17	8·9	60
Wellington, N.Z.	1010·9	— 2·4	75	45	66·1	55·0	60·5	— 2.0	57·9	78	7·6	2·15	− 1·18	13	7·1	48
Suva, Fiji	1005·8	— 1·9	90	69	85·2	74·6	79·9	0·0	75·6	79	7·3	14·28	+ 3·56	23	5·7	44
Apia, Samoa	1006·0	— 1·9	87	73	84·3	75·3	79·8	+ 0·8	77·6	83	7·2	24·22	+ 7·41	27	3·6	28
Kingston, Jamaica	1014·6	— 0·5	89	63	85·4	67·3	76·3	− 0·5	65·8	83	5·0	0·55	− 0·41	8	6·1	54
Grenada, W.I.	1009·4	— 3·2	86	69	83·5	72·2	77·9	+ 0·9	72·1	78	2·1	4·40	— 0·03	17	..	..
Toronto	1016·2	— 1·2	45	— 1	29·4	16·7	23·1	+ 1·0	19·1	68	7·4	5·46	+ 2·59	22	3·0	32
Winnipeg	1022·7	+ 2·9	17	—30	— 2·5	−17·5	−10·0	− 5·6	..	..	3·6	0·49	− 0·33	11	4·9	57
St. John, N.B.	1011·0	— 4·7	53	—12	28·4	10·5	19·5	+ 0·3	14·9	68	5·7	4·68	— 0·12	19	3·9	42
Victoria, B.C.	1019·0	+ 3·7	48	14	38·6	31·5	35·1	− 5·0	32·9	83	7·1	2·33	− 2·18	11	2·5	28

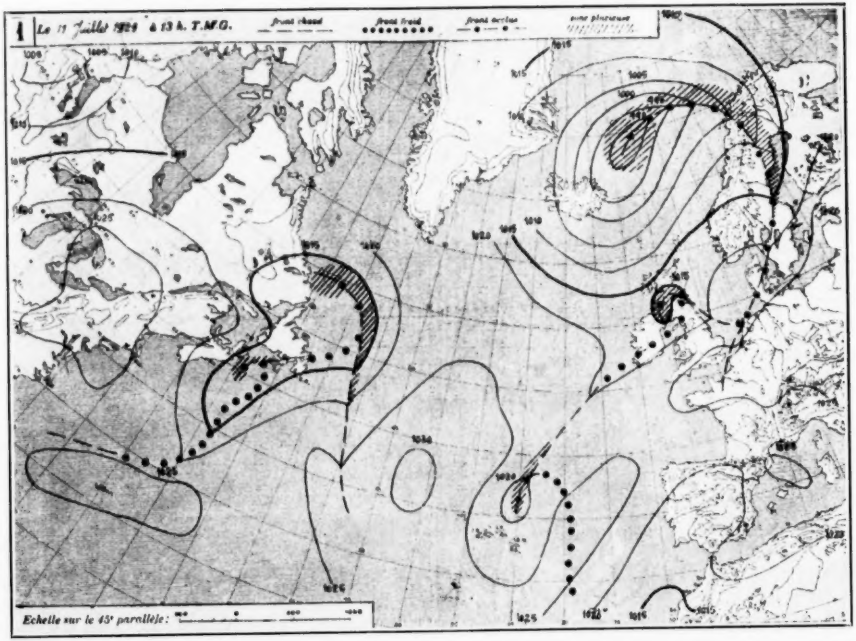
* For Indian stations a rain day is a day on which 0·1 in. or more rain has fallen.

Eyretum, June, 1929, page 127. Note *should read*—Malta (Vallum) : station moved from 35° 53′N., 14° 30′E., 183 ft. to 35° 54′N., 14° 31′E., 300·0 ft. from April 30th, 1928.

Winnipeg	1022·7	+ 2·3	17	—30	—2·3	-17·3	-10·0	— 3·6	..	..	3·6	0·49	— 0·33	11	4·9	57
St. John, N.B.	1011·0	— 4·7	53	—12	28·4	10·5	19·5	+ 0·3	14·9	68	5·7	4·38	— 0·12	19	3·9	42
Victoria, B.C.	1019·0	+ 3·7	48	14	38·6	31·5	35·1	— 5·0	32·9	83	7·1	2·33	— 2·18	11	2·5	28

* For Indian stations a rain day is a day on which 0·1 in. or more rain has fallen.

Erratum, June, 1929, page 127. Note *should read*—Malta (Valletta), station moved from 35° 53′N., 14° 31′E., 159 ft. to 35° 54′N., 14° 31′E., 298 ft. from South Pole, 1927.



Bulletin Quotidien d'Etudes, JULY 11TH, 1929, PAGE 3 (*see page* 154).

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